

AMENDMENTS TO THE CLAIMS:

Claim 1. (Currently amended) An electric power steering apparatus adapted to transmit power supplied from an electric motor for assisting steering, the electric power steering apparatus comprising:

a driving gear and a driven gear through which the power is transmitted,

wherein backlash between the driving gear and the driven gear is set at least in a neighborhood region of a steering neutral position to be smaller than that in a remaining region, and

wherein at least one of said driven gear and said driving gear comprises a bias portion that sets said backlash.

Claim 2. (Currently amended) The electric power steering apparatus according to claim 1, wherein said ~~the~~ driven gear includes said a bias portion formed by biasing a part of an outer periphery of teeth in a direction in which the backlash is decreased.

Claim 3. (Previously presented) The electric power steering apparatus according to claim 1, wherein the driving gear comprises a worm, the driven gear comprises a worm wheel, and a shaft center of the worm is offset in an axial direction of the worm wheel by a predetermined offset amount.

Claim 4. (Previously presented) The apparatus of claim 1, wherein said neighborhood region comprises a steering angular range on each side of said steering neutral position.

Claim 5. (Previously presented) The apparatus of claim 4, wherein said steering angular range comprises a substantially equal steering angle on each side of said neutral position.

Claim 6. (Previously presented) The apparatus of claim 5, wherein said steering angle comprises about twenty degrees of steering angle.

Claim 7. (Previously presented) The apparatus of claim 4, wherein said remaining region comprises a steering angle that exceeds said steering angular range.

Claim 8. (Previously presented) The apparatus of claim 1, wherein:

ΔRA corresponds to an amount of change in a gearing angle RA per arc-minute of backlash between said driving gear and said driven gear;

α corresponds to a pressure angle between said driven gear and said driving gear;

D corresponds to a pitch circle diameter of one of said driving gear and said driven gear; and

$$\Delta RA = (\pi \times D) / (360 \times 60 \times 2 \times \tan(\alpha)).$$

Claim 9. (Previously presented) The apparatus of claim 8, wherein when the pitch circle diameter ranges from about 80 millimeters to about 100 millimeters and wherein the amount of change in gearing angle RA per arc-minute of backlash ΔRA comprises a range of about 22 micrometers to about 28 micrometers.

Claim 10. (Previously presented) The apparatus of claim 1, wherein said backlash

changes gradually between said neighborhood region of operation and said remaining region of operation.

Claim 11. (Canceled).

Claim 12. (Currently amended) The apparatus of claim 1 ~~11~~, wherein said bias portion is provided on an outer peripheral portion of the teeth of ~~on~~ said at least one of said driving gear and said driven gear.

Claim 13. (Previously presented) The apparatus of claim 1, wherein at least one of said driving gear and said driven gear comprises a first radius of a pitch circle corresponding to said neighborhood region that is larger than a second radius of a pitch circle corresponding to said remaining region.

Claim 14. (Previously presented) The apparatus of claim 13, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is smaller than said first radius.

Claim 15. (Previously presented) The apparatus of claim 13, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is larger than said second radius.

Claim 16. (Currently amended) A power steering apparatus comprising:

a driving gear; and

a driven gear engaging the driving gear such that a backlash between the driving gear and the driven gear is smaller in a first range of operation than a second range of operation,

wherein at least one of said driven gear and said driving gear comprises a bias portion that corresponds to said first range of operation.

Claim 17. (Currently amended) The apparatus of claim 16, wherein the first range of operation corresponds to a neutral position for a steering wheel of a vehicle comprising the electric power steering apparatus.

Claim 18 (Previously presented) The apparatus of claim 17, wherein the neutral position corresponds to a straight traveling condition for said vehicle.

Claim 19. (Canceled).

Claim 20. (Currently amended) The apparatus of claim ~~16~~ 19, wherein said bias portion is provided on an outer peripheral portion of the teeth on said at least one of said driving gear and said driven gear.

Claim 21. (Previously presented) The apparatus of claim 16, wherein one of said driving gear and said driven gear comprises a worm gear and the other of said driving gear and said driven gear comprises a worm wheel engaging said worm gear.

Claim 22. (Previously presented) The apparatus of claim 21, wherein a shaft center of said worm is offset in an axial direction relative to said worm wheel by a predetermined offset amount.

Claim 23. (Previously presented) The apparatus of claim 16, wherein at least one of said driving gear and said driven gear comprises a first radius of a pitch circle corresponding to said first range of operation that is larger than a second radius of a pitch circle corresponding to said second range of operation.

Claim 24. (Previously presented) The apparatus of claim 23, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is smaller than said first radius.

Claim 25. (Previously presented) The apparatus of claim 23, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is larger than said second radius.

Claim 26. (Previously presented) The apparatus of claim 16, wherein the first range of operation corresponds to a steering angular range about a neutral steering position.

Claim 27. (Previously presented) The apparatus of claim 26, wherein said steering angular range comprises a substantially equal steering angle on each side of said neutral steering position.

Claim 28. (Previously presented) The apparatus of claim 26, wherein said steering angular range comprises about twenty degrees of steering angle.

Claim 29. (Previously presented) The apparatus of claim 16, wherein:

ΔRA corresponds to an amount of change in a gearing angle RA per arc-minute of backlash between said driving gear and said driven gear;

α corresponds to a pressure angle between said driven gear and said driving gear;

D corresponds to a pitch circle diameter of one of said driving gear and said driven gear; and

$$\Delta RA = (\pi \times D) / (360 \times 60 \times 2 \times \tan(\alpha)).$$

Claim 30. (Previously presented) The apparatus of claim 29, wherein when the pitch circle diameter ranges from about 80 millimeters to about 100 millimeters and wherein the amount of change in gearing angle RA per arc-minute of backlash ΔRA comprises a range of about 22 micrometers to about 28 micrometers.

Claim 31. (Previously presented) The apparatus of claim 16, wherein said backlash changes gradually between said first region of operation and said second region of operation.

Claim 32. (Previously presented) The apparatus of claim 16, further comprising a motor for providing a steering assistance torque to said driving gear and wherein said first region of operation corresponds to a region of operation where said drive motor provides a smaller steering assistance torque than said second region of operation.